Microorganism Die-Off Rates Under Various Conditions

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New York-New Jersey Harbor Estuary Program is charged to undertake an assessment of New York City Combined Sewer Overflow (NYC CSO) model for use in developing Total Maximum Daily Loads (TMDLs), which are scheduled for submission to EPA Region 2 by May 2006. A TMDL is defined as the maximum amount of a pollutant that a water body can receive and still meet the water quality standard. *Enterococci*, along with total and fecal coliforms, were recommended to be used as indicator organisms for developing the TMDLs. This recommendation is based on the existing New Jersey water quality standard for *enterococci* as well as the U.S. EPA Action Plan for Beaches and Recreational Waters.

A significant number of die-off rates for total and fecal coliforms have been reported in the literature. However, data on die-off rates for *enterococci* and effects of natural factors such as temperature, salinity, and ultraviolet radiation on die-off rates are limited. A research study was conducted at the NRMRL to generate die-off rates for total coliforms, fecal coliforms, and *enterococci* under the conditions observed in the NY-NJ harbor. The study was conducted with a stormwater sample collected from an outfall located on U.S. EPA's Urban Watershed Research Facility in Edison, New Jersey. The effect of temperature on microorganism decay has been completed at temperatures of 10, 20, and 30°C. In addition, the effect of salinity at concentrations of 10, 20, and 30 parts per thousand on microorganism decay has been completed. A study of the effects of ultraviolet radiation is ongoing.

The time dependence of microorganism decay can be modeled through first-order kinetics written as $C = C_o e^{-kt}$; where, C = concentration of organism at time t (CFU/100 mL); C_0 = concentration of organism at time 0 (CFU/100 mL); k = die-off constant (1/day); t = time (day). The constant varies with temperature, salinity, and solar radiation. The results of the study will be presented in the poster.